Fermi National Accelerator Laboratory
Batavia, IL 60510

CMS ME3/1 ANODE PANEL COMPONENT SOLDERING TRAVELER

Reference Drawing(s)

Endcap Muon Chamber ME3/1 Final Assembly
5520-ME-368310

Endcap Muon Chamber ME3/1 Anode Panel Assy
Anode 5520-ME-368311

Budget Code:	**Project Code:**
Released by:	**Date:**
Prepared by: M. Hubbard, B. Jensen, L. Lee	

Title	Signature	Date
TD / E&F Process Engineering	**Bob Jensen/Designee**	
TD / E&F CMS Assembly	**Glenn Smith/Designee**	
TD / E&F Technological Physicist	**Oleg Prokofiev/Designee**	
TD / CMS Project Manager	**Giorgio Apollinari/Designee**	

Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	04/26/00

Ensure appropriate memos and specific instructions are placed with the traveler before issuing the sub traveler binder to production.

1.0 General Notes

1.1 White (Lint Free) Gloves (Fermi stock 2250-1800) or Nitrile Gloves (Fermi stock 2250-2040) shall be worn by all personnel when handling all product parts after the parts have been prepared/cleaned.

1.2 All steps that require a sign-off shall include the Technician/Inspectors first initial and full last name.

1.3 No erasures or white out will be permitted to any documentation. All incorrectly entered data shall be corrected by placing a single line through the error, initial and date the error before adding the correct data.

1.4 All Discrepancy Reports issued shall be recorded in the left margin next to the applicable step.

1.5 All personnel performing steps in this traveler must have documented training for this traveler and associated operating procedures.

1.6 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.

1.7 Cover the panel/chamber with Mylar when not being serviced or assembled.

1.8 Never hand/ pass anything over a panel as dropped items may damage the panel.

2.0 Parts Kit List

2.1 Attach the completed Parts Kit for this production operation to this traveler. Ensure that the serial number on the Parts Kit matches the serial number of this traveler. Verify that the Parts Kit received is complete.

_____ _____

Process Engineering/Designee Date

3.0 Panel Preparation

Completed

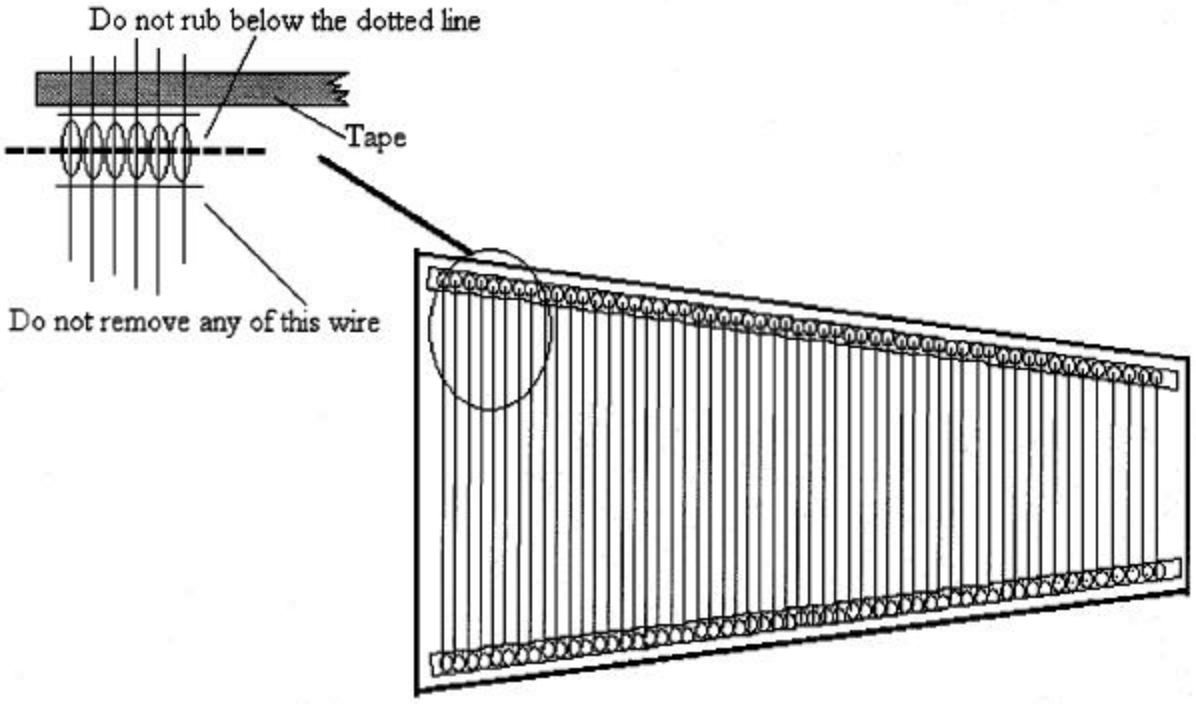
3.1 Acquire the appropriate Anode Panel as per serial number on the bottom of this traveler. Visually inspect the Anode Panel to ensure that there is no damage. ❒

3.2 Transport the Anode Panel using the panel transport cart (MD-368810) to the Panel Component Soldering Station. ❒

3.3 Rotate the panel with the serial number facing UP and place on the Anode Panel Component Soldering Station using approved lifting methods. ❒

3.4 Remove the threaded and straight wire winding combs and associated tooling. ❒

3.5 Return all tooling for usage on the next panel.



3.6 Rub the wires with Ethyl Alcohol (Fermi Stock No. 1920-0600), and a low-lint wipe (Fermi Stock No. 1660-2500) to break off the wires. ❒

Note(s):

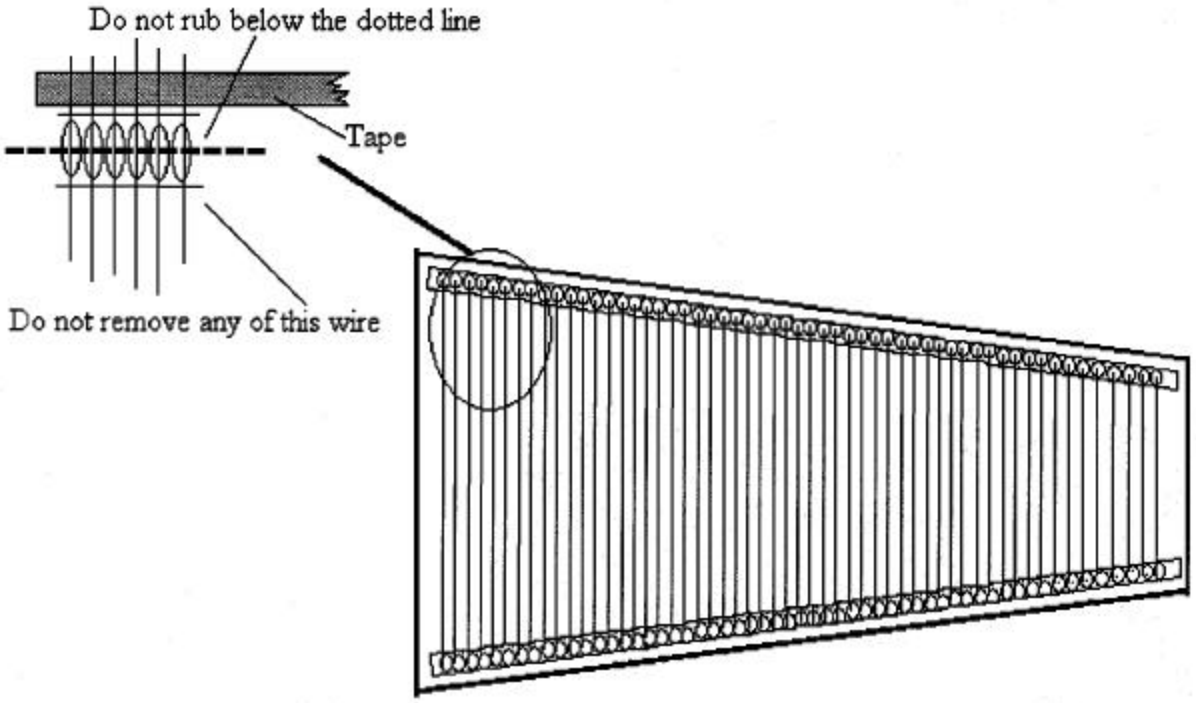
Never scrub the inner half of the soldering pad.

Change the cotton wipes often to clean the pads and prevent debris from falling on the wires.

3.7 Inspect the ends of the soldering pads with a magnified glass where the wires were just rubbed off to ensure there are no small pieces of wire left. If there, carefully pluck them off with tweezers. ❒

Completed

3.8 Rotate the panel 180° so the Non-Serial Number side is facing up. ❒



3.9 Rub the wires with Ethyl Alcohol (Fermi Stock No. 1920-0600), and a low-lint wipe (Fermi Stock No. 1660-2500) to break off the wires. ❒

Note(s):

Never scrub the inner half of the soldering pad.

Change the cotton wipes often to clean the pads and prevent debris from falling on the wires.

3.10 Inspect the ends of the soldering pads with a magnified glass where the wires were just rubbed off to ensure there are no small pieces of wire left. If there, carefully pluck them off with tweezers. ❒

_____ _____

Technician(s) Date

X 3.11 Verify all Section 3.0 steps have been properly completed and signed off and the panel is acceptable for further processing.

_____ _____

Lead Person Date

4.0 Serial Number Side Panel Component Soldering

Completed

4.1 Rotate the panel so the Serial Number side is facing up. ❒

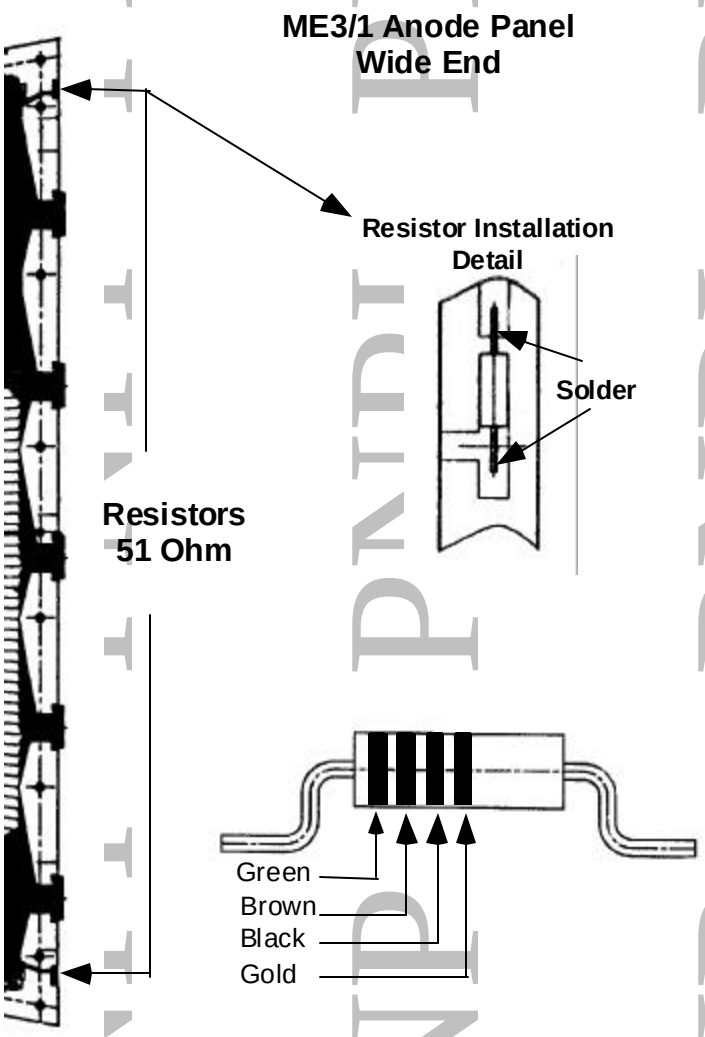
4.2 Install two 51 Ohm (Ω) Resistors (MA-368094) onto the panel at the wide end in accordance with Anode Panel Dwg (MD-368311) and diagrams below. ❒

Note(s):

Verify correct color code of the resistors as per below diagram.

Verify correct locations as per Dwg and diagram below.

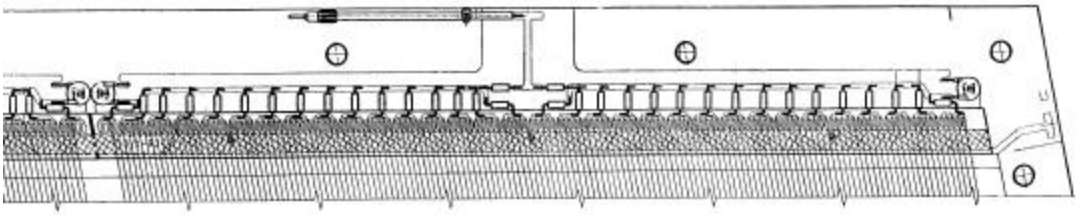
After soldering the resistors to the panel ensure that the resistor is not shorted to ground.

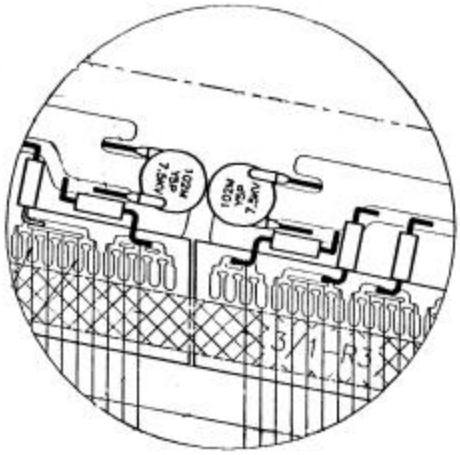


Technician(s) _____ Date _____

Completed

4.3 Starting from the Panel Narrow End, Right side, install resistors, capacitors and High Voltage Wire Lead Assy as per Dwg ME-368311 and diagram. Ensure correct dimensional placement is followed during the soldering process. ❒





4.3.1 1.0 Mohm Resistor (MA-368256) [6 ea.] ❒

4.3.2 4.7 Mohm Resistor (MA-368425) [6 ea.] ❒

4.3.3 4.7 Mohm Resistor (MA-368426) [6 ea.] ❒

4.3.4 4.7 Mohm Resistor (MA-368254) [78 ea.] ❒

4.3.5 4.7 Mohm Resistor (MA368197) [6 ea] ❒

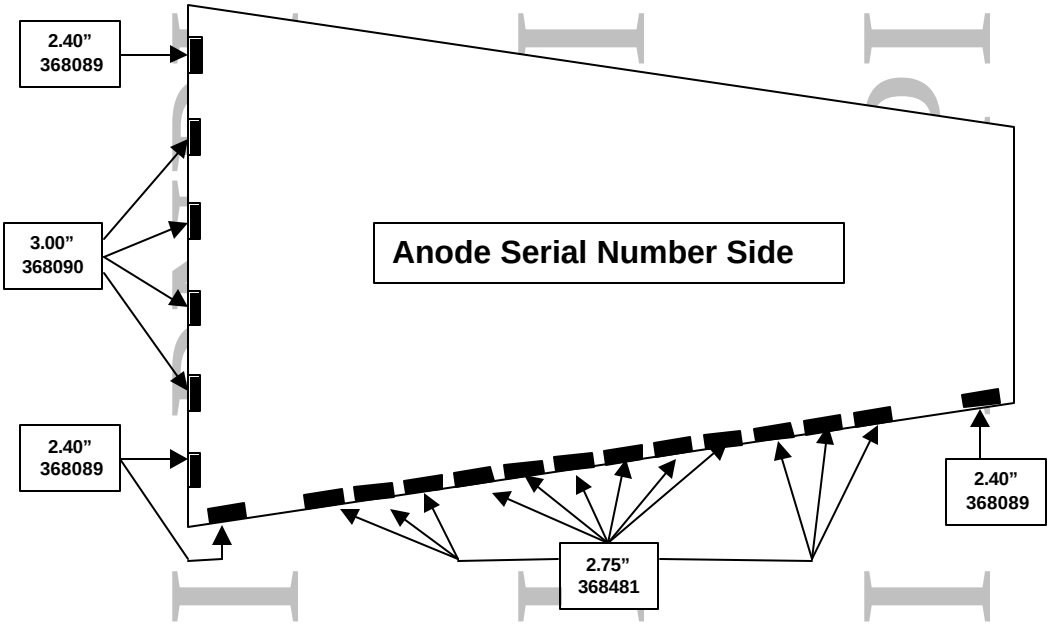
4.3.6 Capacitors w/bent leads (MA-368260)[6 ea.] ❒

4.3.7 High Voltage Lead Wire Assy (MB-368048) [3 ea] ❒

Technician(s) _____ Date _____

Completed

4.4 Using the Grounding Strip Installation Templates, layout the panel for Grounding Strip installation. Mark Strips installation area lightly using a scribe. ❒



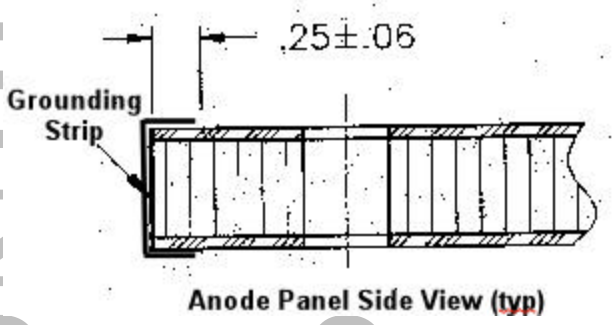
4.4.1 Strips layout scribed on left side of panel from the narrow end (14 locations). ❒

4.4.2 Strips layout scribed on Wide end of panel (6 locations). ❒

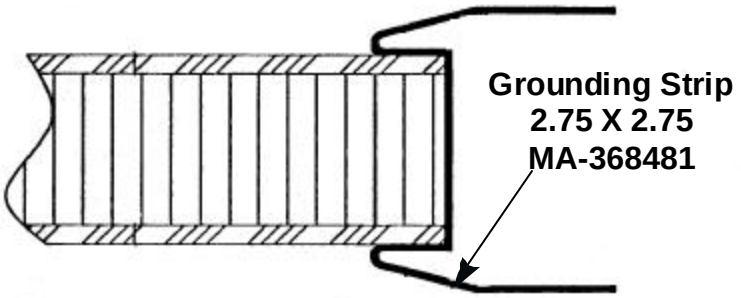
Technician(s) _____ Date _____

Completed

4.5 Form the Grounding Strips on the wide end of the panel as per Dwg ME-368311 and the below diagram. ❒



4.6 On the left side of the panel from the narrow end, form the Grounding Strips as in the diagram below. ❒



Technician(s) _____ Date _____

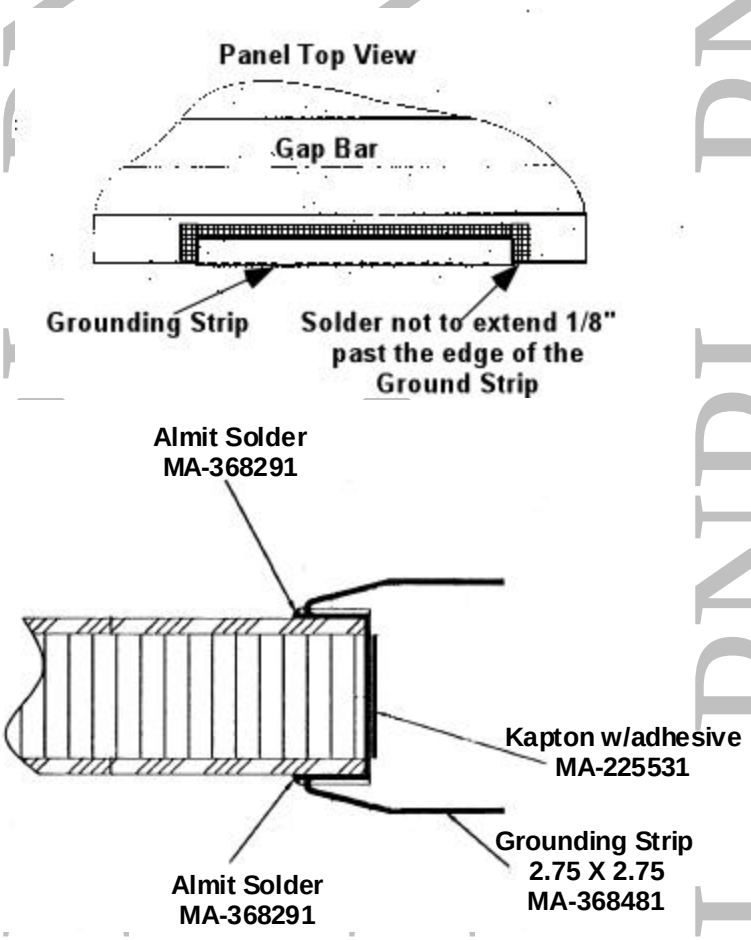
Completed

4.7 Place a strip of Almit Solder (MA-368391) under the Strips at the top of the panel. Solder the Strips to the top of the panel Only!! Make sure the solder is smooth when cooled. Continue soldering the Grounding Strips tops to the panel until all the Grounding Strips have been soldered to the panel. ❒

Note(s):

When soldering Strips to the panel, ensure that no more than 1/8" exceeds past the Strips.

Ensure that after soldering of the Strips, there is no lumps or excess build up of solder on the panel or Strips.

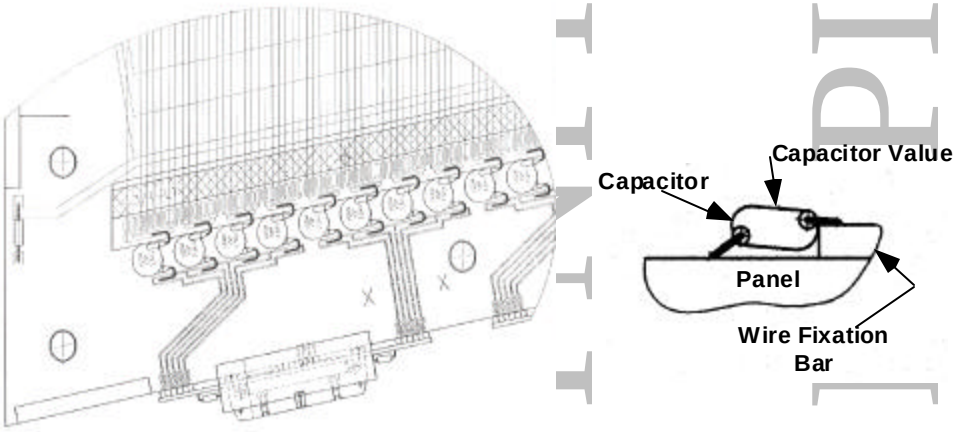


4.8 Apply a piece of adhesive Kapton Tape (MA-225531) to the 12 (MA-368481) Grounding Strips on the left side of the panel from the narrow end, as shown in above drawing. ❒

Technician(s) _____ Date _____

Completed

4.9 Starting from the Panel Narrow End, Left side, install and solder Capacitors as per Dwg ME-368311 and diagram. Ensure correct dimensional placement is followed during the soldering process. ❒



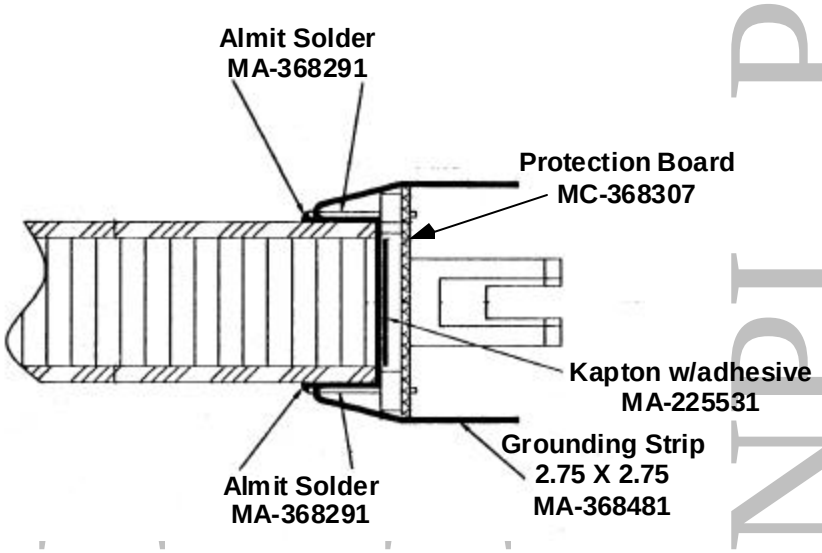
4.9.1 Capacitors w/180° leads (MA-368258) [96 ea.]. Ensure Capacitor Value/Label is visible after soldering. ❒

4.10 Place the Protection Boards (MB-368307) in the proper location as per Dwg ME-368311. ❒

Note(s):

Ensure the boards are pushed up tight to the edge of the panel before soldering.

4.10.1 Solder the Protection Board (MB-368307)[12 ea.] leads(3 sections of 6 leads per board) to panel using Almit Solder (MA-368291). ❒



Technician(s) _____ Date _____

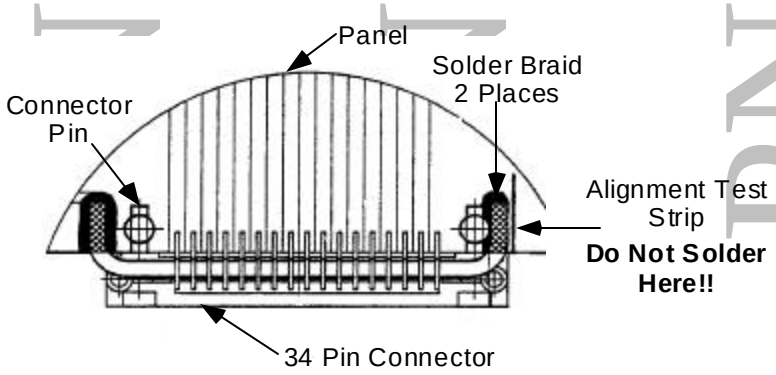
Completed

4.11 On the wide end of the panel, install the Connector Assy – 34 Pin (MA-368092)[5 ea] with brass pins as per Dwg 368311 and below diagram. ❒

4.12 Expand the brass pins on the 34-Pin Connectors(MA-368092) using the Crimping Tool (MA-XXXXXX). ❒

Note(s):

During installation of Connector Assy ensure correct placement of the 17 solder pins.

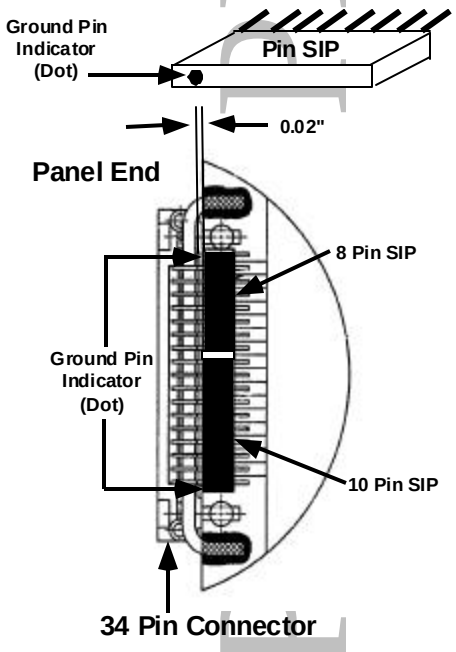


4.13 Install 8-Pin and 10-Pin SIPs onto the top of the 34-Pin Connectors according to the diagram below.

Note(s):

Ensure the Ground Pins (indicated by a dot) are located to the outside edges in accordance with the drawing.

Back edge of SIPs must be flush with the edge of the connector within 0.02".



Completed

4.14 Verify that all connectors and SIPs are in the proper location. Ensure the solder pins make contact with the panel, prior to soldering. ❒

Note(s):

Ensure that during the pin soldering operation that no solder flows to the adjoining pins.

4.15 Solder the Connector Assy pins and the SIPs pins to the panel using Almit Solder (MA-368291.) ❒

4.16 Solder the Connector Assy Braid, using Almit Solder (MA-368291), to the panel according to Dwg ME-368311 and as shown in above diagram. ❒

_____ _____

Technician(s) Date

X 4.17 Inspect panel to ensure that all components have been installed and/or soldered correctly in accordance with Anode Panel DWG 368311 and the panel is acceptable for further processing.

_____ _____

Lead Person Date

5.0 Panel Testing

5.1 Using a Multimeter measure the resistor value of both 51 Ohm resistors. Resistor value should read between 48 ? to 54 ?.

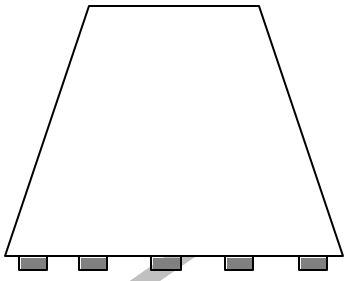
Resistor	Pass	Fail
Resistor #1		
Resistor #2		

Note(s):

If resistor measurement is not within range, replace the resistor. After replacement, re-measure the resistor.

Technician(s) Date

5.2 Using a Multimeter, and a Toggle Switch Box, check the continuity in resistance of the Sips. Beginning at the left side of the wide end, measure each strip by flipping the corresponding switch on the box.



Note(s):

All measurements must be within the range of 0.9 – 1.1 Mohm.

Resistance Value?	**1 Meg Ohm**	
Sip Location	Pass	Fail
Location #1		
Location #2		
Location #3		
Location #4		
Location #5		

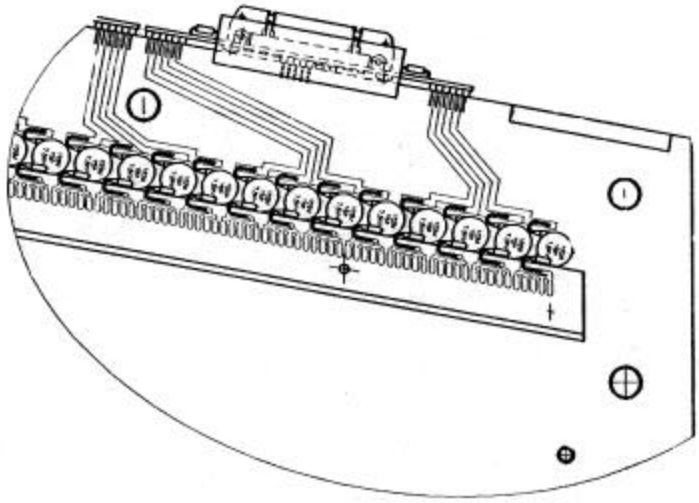
Technician(s) Date

6.0 Non-Serial Number Side Panel Component Soldering

Completed

6.1 Rotate the Panel so the Non-Serial number side faces up, and re-install the panel onto the Panel Component Soldering Station using approved lifting methods. ❒

6.2 Starting from the Panel Narrow End, Right side, install Capacitors, as per Dwg ME-368311 and diagram. Ensure correct dimensional placement is followed during the soldering process. ❒

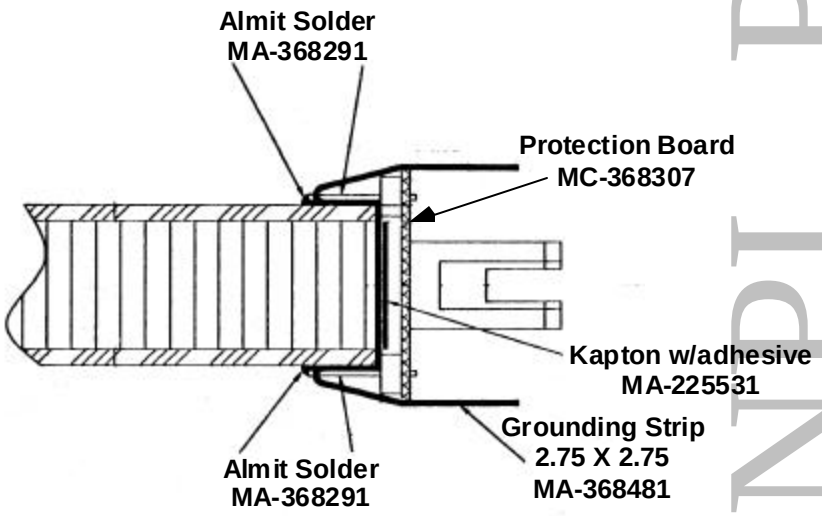


6.2.1 Capacitors w/180° leads (MA-368258) [96 ea] ❒

Note(s):

Ensure Protection Boards are pushed up tight to the edge of the panel before soldering.

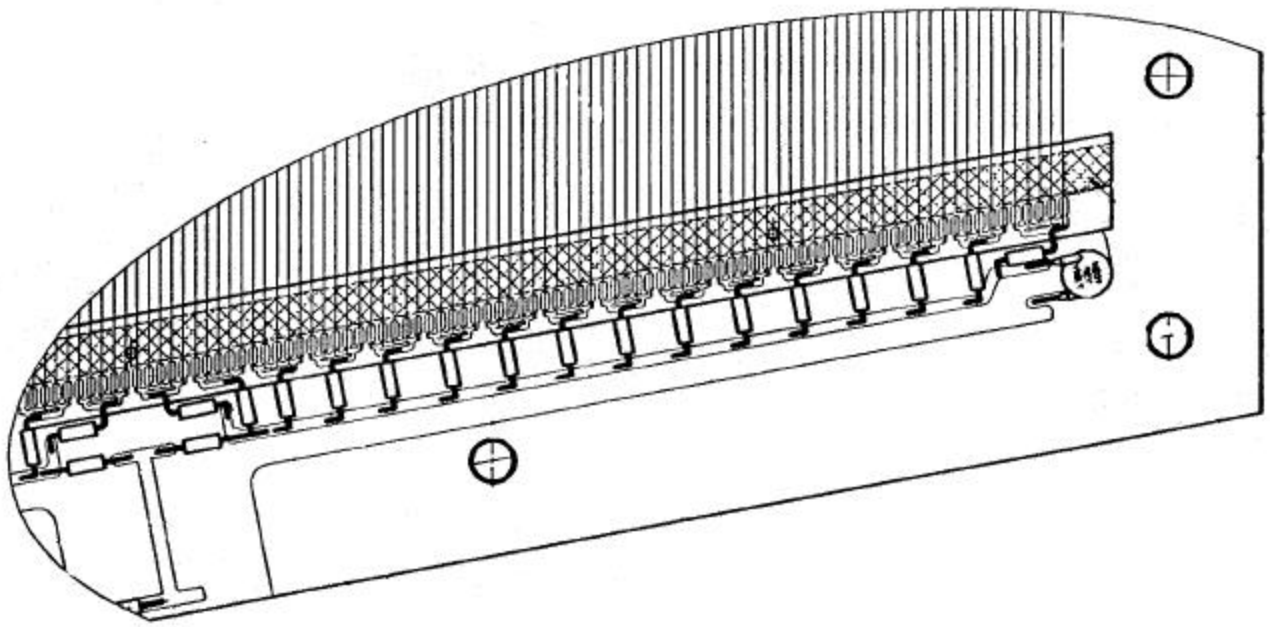
6.3 Solder Protection Board leads (3 sections of 6 leads per board) and Grounding Strips to panel using Almit Solder (MA-368291) ❒

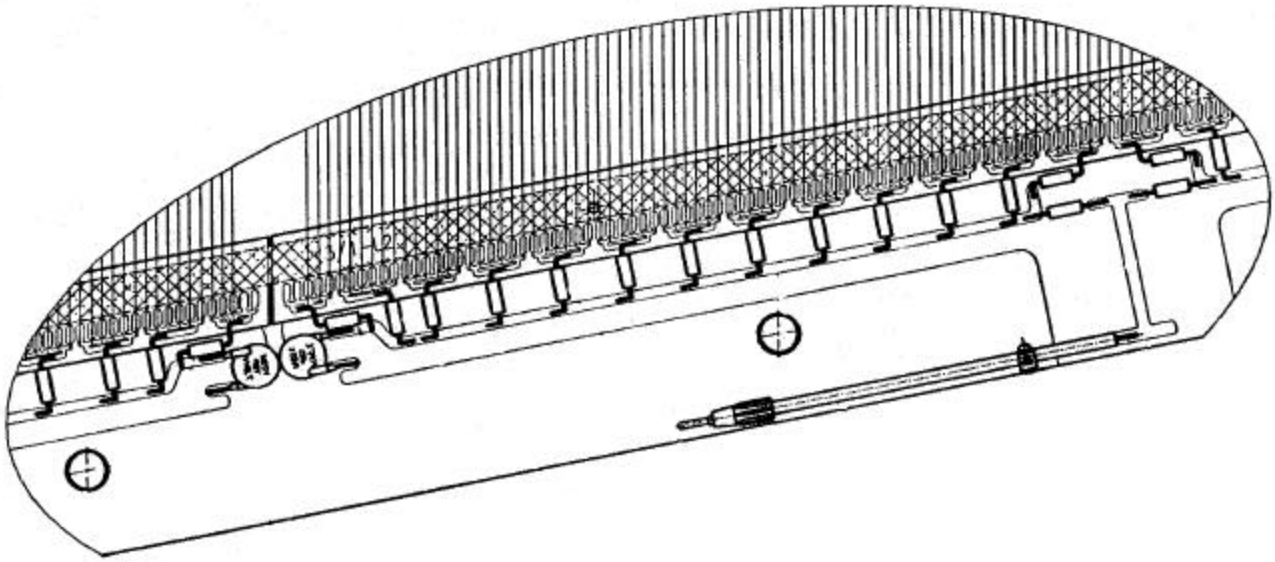


Technician(s) _____ Date _____

Completed

6.4 Starting from the Panel Narrow End, Left side install resistors, capacitors and High Voltage Wire Lead Assy as per Dwg ME-368311 and diagram. Ensure correct dimensional placement is followed during the soldering process. ❒





Completed

6.4.1 1.0 Mohm Resistor (MA-368256) [6 ea.] ❒

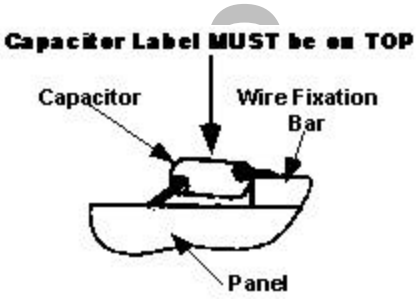
6.4.2 4.7 Mohm Resistor (MA-368425) [6 ea.] ❒

6.4.3 4.7 Mohm Resistor (MA-368426) [6 ea.] ❒

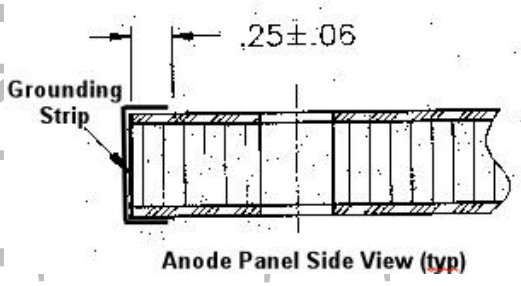
6.4.4 4.7 Mohm Resistor (MA-368254) [78 ea.] ❒

6.4.5 4.7 Mohm Resistor (MA368197) [6 ea] ❒

6.4.6 Capacitors w/bent leads (MA-368260)[6 ea.] ❒

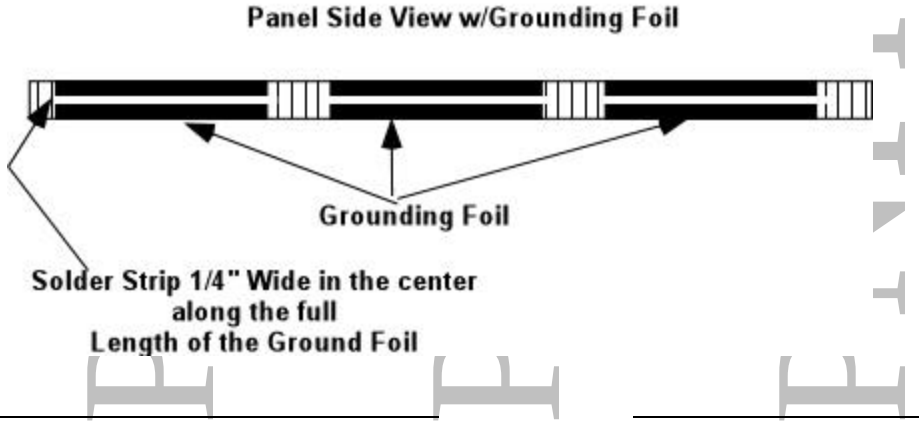


6.4.7 High Voltage Lead Wire Assy (MB-368048) [3 ea] ❒



6.5 Solder all the Grounding Strips on the wide end to the Non-Serial side of the panel. ❒

6.6 Solder a ¼" wide strip in the center along the full length of each Grounding Strip on the wide end. ❒



Technician(s) Date

6.7 Secure High Voltage Lead Wire Assy (MB-368048) to the panel using a Cable Tie (MA-368027) [3 ea.].

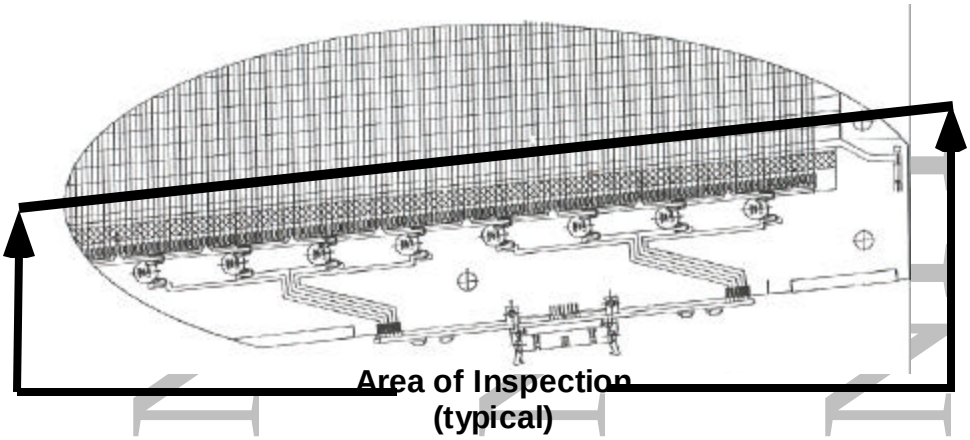
Technician(s) Date

X 6.8 Inspect panel to ensure that all components have been installed and/or soldered correctly in accordance with Anode Panel DWG 368311 and the panel is acceptable for further processing.

X 6.9 Visually inspect the panel from the edge inward to approximately 1" past the Wire Fixation Bars. This inspection is on both long sides on both strip and non-strip sides of the panel. Visually inspect using a magnifying glass and remove all wire debris, unwanted solder globs and other foreign material, using approved methods and equipment.

Note(s):

Special attention is needed around all soldered components (i.e., resistors, capacitors, protection boards, etc.) to ensure all foreign material is removed.



Lead Person Date

7.0 Panel Transport/Staging

Completed

7.1 Remove the completed Anode panel from the Soldering Station and install it on the Panel transport cart. ❒

7.2 Remove the protective Mylar protecting the wire from both sides of the panel. ❒

Note(s):

EXTREME CARE must be used during the mylar removal process to prevent damage to any of the wires.

7.3 Remove all extra 50µm wires from panel. (Between 200µm wires and start/Finish locations) ❒

7.4 Blow off the panel with ionized air to clean off any debris. ❒

7.5 Transport the completed panel to the Anode Panel Electrical Testing area. ❒

_____ _____

Technician(s) Date

8.0 Production Complete

XXX 8.1 Process Engineering verify that the CMS ME3/1 Anode Panel Soldering (5520-TR-333463) is accurate and complete. This shall include a review of all steps to ensure that all operations have been completed and signed off. Ensure that all Discrepancy Reports, Nonconformance Reports, Repair/Rework Forms, Deviation Index and dispositions have been reviewed by the Responsible Authority for conformance before being approved.

Comments:

_____ _____

Process Engineering/Designee Date

9.0 Attach the Process Engineering "OK to Proceed" Tag on the panel.

_____ _____

Process Engineering/Designee Date

10.0 Proceed to the next major assembly operation as required.